

REMARKS

Reconsideration is respectfully requested in view of the following remarks.

Applicant has amended independent claim 8 to reflect a preferred embodiment of the invention wherein the cathode also comprises a manganese dioxide in addition to the already recited CuV₂O₆. Accordingly, claim 10 which recites the addition of a manganese dioxide has been canceled. Independent claim 8 has been further amended for clarity to add "primary" before "nonrechargeable cell".

It is clear from the description that Applicant's cell is a primary (nonrechargeable) cell and the term "primary (nonrechargeable)" is expressly stated for example at p. 7, lines 1-2. The term "primary cell" as used throughout the description in reference to the cell of the invention also appears, at p. 10, line 7,; p. 14, line 26; and p. 28, line 12 and is a recognized term in the art meaning a "nonrechargeable cell". (By contrast a "secondary cell" is recognized as meaning a "rechargeable cell".) The term "rechargeable cell" or "rechargeable battery" has the common meaning in the consumer art that the cell is suitable for recharging a multiplicity of times. For example, common rechargeable batteries, such as many nickel metal hydride batteries, readily available in the consumer market, are advertised as being rechargeable up to 1000 times. The lithium ion rechargeable battery available for notebook computers and digital cameras are also expected to be rechargeable many, many times before they need to be replaced. By contrast primary cells, for example, most all zinc/MnO₂ alkaline cells, zinc/air cells for hearing aids, or lithium/MnO₂ cells for cameras and the like are recognized (and advertised)

as intended for use as a primary nonrechargeable cell. In fact the manufacturer usually warns on the package that after the cell is discharged, recharging of the cell should not be attempted. The Examiner is permitted to take Judicial Notice of such common meaning of the above terms "primary (nonrechargeable) cell" and "rechargeable cell". (MPEP 2144.03)

Applicant has added a new independent claim 25 which has all of the subject matter of independent claim 8 including that the cell is a primary nonrechargeable cell having an anode comprising lithium and a cathode comprising CuV₂O₆ and a manganese dioxide, but further also recites that the cell has an electrolyte comprises lithiumtrifluoromethylsulfonate (CF₃SO₃Li). Although other possible non aqueous electrolytes are mentioned in the description, it should be clear from Applicant's examples that lithiumtrifluoromethylsulfonate (CF₃SO₃Li) is preferred. In fact all of Applicant's examples (including the comparative example) utilize a nonaqueous electrolyte consisting of 0.6M (CF₃SO₃Li) in a mixture of ethylene carbonate, propylene carbonate, and dimethoxyethane solvent. (See, Applicant's specification at p. 18, lines 20-24.) Thus, Applicant's cell of Example 4 (specification at p.22-23) also utilizes the above specific (CF₃SO₃Li) electrolyte. Specifically, Example 4 recites a preferred embodiment of Applicant's primary cell having an anode comprising lithium and a cathode comprising a mixture comprising 35 wt% CuV₂O₆, 35 wt% manganese dioxide active material, 27 wt.% graphite, and 3 wt.% Teflon binder (electrolyte free basis). The results in Table 1 show notable performance improvement of the cell of Example 4 having a cathode comprising CuV₂O₆ and manganese dioxide in admixture as compared to a conventional primary lithium cell having a conventional manganese dioxide cathode without any CuV₂O₆.

The Examiner has rejected independent claim 8 and claims 12-13 under 35 USC 102 as anticipated by the newly cited reference Yoji Sakurai, "Rechargeable Copper Vanadate Cathodes for Lithium Cell", Journal of the Electrochemical Society, Vol 135, No.1 (Jan. 1988), p.32-36. The Examiner states that Sakurai teaches a Li/CuV₂O₆ cell (at p.34). Sakurai also teaches a Li/Cu₂V₂O₇ cell. The Examiner also states that Sakurai also teaches on p. 32 that the cathode mixture comprises such copper vanadate powder (CuV₂O₆ or Cu₂V₂O₇), Ketjen black powder as the conductive diluent and PTFE powder in a weight ratio of 70:27:3 and that the electrolyte comprises LiClO₄ salt in a solvent mixture of polycarbonate (PC) and 1,2,-dimethoxy ethylene (DME).

A view of Sakurai as a whole clearly indicates that he is preoccupied with producing and testing a rechargeable cell having a lithium anode and CuV₂O₆ (or Cu₂V₂O₇) cathode. There is no concern or mention anywhere in the reference that Sakurai intends to produce or test a primary (nonrechargeable) cell.

A close inspection of Sakurai reveals that he is using a very specific electrolyte for his test cells. Namely, the electrolyte is specified as 1M LiClO₄ in (propylene carbonate, + 1,2 dimethoxyethane (DME) solvent) and 1.5M LiAsF₆ in 2-methyltetrahydrofuran. The use of such very specific electrolyte formulation is likely a significant factor in his obtaining the rechargeability characteristic of his cell having a lithium anode and cathode of CuV₂O₆ active material. **In any event as the Examiner has already pointed out, there is no disclosure in Sakurai of adding a manganese dioxide to the CuV₂O₆ cathode. (Examiner's Action, p.3, lines 13-15.)**

Sakurai is preoccupied with testing the recycling characteristic of his lithium/CuV₂O₆ cell and as such does not contemplate adding other actives to the cathode, in particular Sakurai does not contemplate adding a manganese dioxide to the cathode. Since Sakurai does not disclose adding a manganese dioxide to the cathode, it cannot anticipate amended independent claim 8, which now includes addition of a manganese dioxide. Also, Sakurai cannot anticipate dependent claims 12-13, which include all of the limitations of amended base claim 8. A reference to anticipate a claim must disclose within its four corners all of the features of the claim. See, e.g. In re Spada, 15 USPQ2d 1655 (Fed. Cir. 1990). Accordingly, the rejection of claim 8 and claims 12-13 under 35 USC 102 in view of Sakurai is believed traversed and withdrawal of the rejection is requested.

The Examiner has not given patentable weight to the language "nonrechargeable cell" which Applicant inserted into claim 8 in the last Amendment. The Examiner has considered this as "an intended use" limitation. The Examiner states that it must also result in some structural (or chemical) difference in order to properly distinguish the claimed invention over the prior art. In keeping with the Examiner's point of view Applicant has now amended claim 8 to recite that a manganese dioxide is included in the cathode comprising CuV₂O₆, that is, the cathode comprises a mixture of CuV₂O₆ and a manganese dioxide. As a preferred embodiment the addition of a manganese dioxide in admixture with the CuV₂O₆ in the cathode is a factor leading to the nonrechargeability characteristic of Applicant's cell. Thus, there is now added support in claim 8 for the specified "nonrechargeable" characteristic of the cell. Accordingly the term "nonrechargeable" in amended claim 8 should now be given due patentable weight as a substantive property

limitation. Thus claim 8 as now amended further distinguishes over Sakurai's disclosure, which is clearly directed to producing and testing a rechargeable battery with no mention therein of a primary nonrechargeable cell.

The Examiner rejects claims 10-11, and 14 under 35 USC 103(a) as unpatentable over Sakurai "Rechargeable Copper Vanadate Cathodes" in view of Isoyama (6,093,503) or Illic (5,158,722) or Nakanishi (6,096,234). The Examiner states that "Sakurai teaches the claimed invention ... but does not teach that the cathode further comprises a manganese dioxide or a lithiated manganese dioxide cathode." The Examiner states that Isoyama teaches at col. 5, lines 20-35, that the positive electrode material includes carbon material, metal oxide materials and conductive polymer materials, preferably it comprises a metallic compound such as LiMn_2O_4 , Li_xMnO_2 , $\text{Li}_2\text{Mn}_3\text{O}_4$, $\text{Cu}_2\text{V}_2\text{O}_7$, MnO_2 , etc. The Examiner states that Illic teaches positive electrodes for primary and secondary cells wherein the positive active material comprising MnO_2 , FeS_2 , CuO , $\text{Cu}_2\text{V}_2\text{O}_7$ and Li_xMnO_y . The Examiner indicates that Nakanishi teaches in col. 19, lines 30-55, that the positive electrode can contain graphite, MnO_2 , $\text{Cu}_2\text{V}_2\text{O}_7$, etc. Nakanishi teaches in col. 1, that the battery can be primary or secondary cell.

The Examiner's position is that it would have been obvious to one of ordinary skill to use two metallic compounds such as CuV_2O_6 as taught in Sakurai and mix it with an MnO_2 (or lithiated manganese dioxide), wherein such MnO_2 is disclosed in the secondary references Isoyama, Illic, or Nakanishi, because "it is *prima facie* obvious to combine two compositions each of which is taught by prior art to be useful for the same purpose in order to form a third composition that is to be used for the

very same purpose". In re Kerkhoven, 205 USPQ 1069, In re Susi, 169 USPQ 423.

In some arts it may be true that the mixture of a component A known useful for a specific purpose with a component B known useful of the same purpose results in an obvious combination of a mixture of A and B, which is specified as useful for the same purpose. However, this is hardly true in all cases. For example, in the chemical arts there may be anticipated (or unanticipated) chemical interactions between components A and B, such that it could not be concluded a priori that the combination would necessarily result in a workable or useful combination for the intended purpose. This is often true when applied to predicting the effectiveness of mixtures of active materials for anode or cathode materials. While two active components, e.g. component A or component B may perform effectively in, for example, a cathode for a particular type of cell, it is well known that the combination of A and B may perform less effectively (or not be effective at all) when present in the cathode in admixture. This can be for a number of different reasons. One such reason is that there can be electrochemical discharge activity directly between the two components A and B, that is, there may be direct shorting (short circuit discharge) occurring between these two components within the cathode as the cell is applied to its ordinary service. This of course results in lost discharge capacity for the cell, resulting instead in internal heating of the cell as a portion of component A discharges to component B (or vice versa) within the cathode itself, rather than with the active anode material as intended.

Sakurai is the only one of the Examiner's cited references which discloses any cell with CuV₂O₆ component in the cathode. And the disclosed cell in Sakurai is a rechargeable cell with a lithium anode. The Examiner acknowledges that Sakurai does not teach adding manganese oxides to the cathode in admixture with the CuV₂O₆. (Present Action, p. 3, lines 13-15.)

To fill the missing information the Examiner points to the reference Isoyama (US 6,093,503) that discloses a secondary lithium battery that may have a cathode comprising Cu₂V₂O₇ or a manganese dioxide. (There is no mention of CuV₂O₆, which is a different compound.) Isoyama presents a long list of possible active materials which may be used in the cathode of his secondary lithium battery. (col. 5, lines 20-35). Cu₂V₂O₇ and MnO₂ as well as other oxides such as V₂MoO₈, MoO₃, V₂O₅, Cr₂O₃, TiS₂, and MoS₂, Li_xMnO₂, etc. appear in the list. There is no specific disclosure in Isoyama discussing or disclosing any mixture of MnO₂ and Cu₂V₂O₇ or that such mixture is desirable. In any event there is no mention at all of CuV₂O₆ in this reference, let alone that a mixture of CuV₂O₆ and a manganese dioxide is desirable.

The Examiner also points to Ilic (US 5,158,722) which discloses a process for the production of a ribbon cathode for a primary or secondary lithium battery. Ilic discloses that the cathode may contain MnO₂, FeS₂, CuO, Cu₂V₂O₇, and Li_xMnO_y. This is merely a list of possible cathode materials. There is no specific disclosure in Ilic discussing any mixture of MnO₂ and Cu₂V₂O₇ or that such mixture is desirable. In any event there is

no mention at all of CuV₂O₆ in Ilic, let alone that a mixture of CuV₂O₆ and a manganese dioxide is desirable.

The Examiner cites Nakanishi (US 6,096,234) for disclosing that a positive electrode may contain MnO₂, Cu₂V₂O₇, graphite, etc. for a primary or secondary cell. This reference is principally directed to disclosing a cross-linked polymer solid electrolyte. It is mentioned in passing at col. 30-55 that the active materials for an electrode may be selected from a list of materials. That is, the inference is that the cross-linked polymer solid electrolyte of the invention is applicable to electrode types comprising metal oxides such as MnO₂, CoO₂, V₂O₅, V₆O₁₃, TiO₂, WO₂, Cr₂O₅, Cr₃O₈, CuO, Cu₂V₂O₇, Bi₂O₃, Bi₂PB₂O₅, and Mo₈O₂. Thus, among the list of possible active components is mentioned MnO₂ and Cu₂V₂O₇. However, there is no discussion in Nakanishi that the mixture of MnO₂ and Cu₂V₂O₇ or a mixture of MnO₂ and CuV₂O₆ in the cathode is desirable. In fact there is no mention at all of CuV₂O₆ in Nakanishi, let alone that a mixture of CuV₂O₆ and a manganese dioxide is desirable.

The Examiner also cites Fujimoto (US 5,358,805) at col. 3 for teaching that it is known that the positive electrode may comprise an active material such as a LiMnO₃, MnO₂, etc. mixed with binder and a conductive agent as Ketjen Black, graphite, etc. This reference also does not disclose or suggest CuV₂O₆ as cathode active material for any cell, let alone in admixture with a manganese dioxide for use in a primary lithium cell.

It is clear that the only one of the cited references that discloses CuV₂O₆ as cathode material for an electrochemical cell is Sakurai and this is in connection with a rechargeable lithium

cell. There is no mention in Sakurai of adding a manganese dioxide to the cathode. Applicant's cell as defined by amended independent claim 8 by contrast is a "primary nonrechargeable" cell. In a preferred embodiment Applicant's cell is made "nonrechargeable" in measure by the addition of a manganese dioxide in admixture with the CuV₂O₆. "Obvious to try" is not the standard of 35 USC 103. See, e.g. In re Antonie, 559 F.2d 618, 620, 195 USPQ 6, 8 (CCPA 1977). Thus the issue is not whether or not it was "obvious to try" a mixture of manganese dioxide and CuV₂O₆. The test is whether the references taken as whole would have suggested Applicant's invention at the time the invention was made. In re Merck & Co., 800 F.2d 1091, 1097, 231 USPQ 375, 379 (1986). There is no teaching in any of the references viewed alone or in any combination of the desirability of utilizing CuV₂O₆ in admixture with a manganese dioxide to result in a cathode which when used in conjunction with a lithium anode results in a primary nonrechargeable cell.

The Court has consistently held that under section 103, teachings of references can be combined only if there is some suggestion or incentive to do so. (Emphasis the Court's.) ACS Hospital Systems, Inc. v. Montefiore Hospital, 221 USPQ 929 at 933 (CAFC 1984). It is impermissible to reconstruct the claimed invention from selected pieces of prior art absent some suggestion, teaching, or motivation in the prior art to do so. See, C.R. Bard, Inc. v M3 Sys., Inc., 48 USPQ 2d 1225 (Fed. Cir 1998). In the present case there is no teaching or suggestion in any of the references of the desirability of forming a cathode for a cell having an anode comprising lithium, wherein the cathode comprises CuV₂O₆ in admixture with a manganese dioxide and resulting in a primary nonrechargeable cell. Accordingly, independent claim 8 as amended is believed patentable under 35

USC 103 over the references Sakurai, Isoyama, Ilic, Nakanishi, or Fujimoto alone or in any combination. Allowance of independent claim 8 as amended is respectfully requested upon the Examiner's reconsideration. Withdrawal of the rejection of claims 10-11, and 14 under 35 USC 103 is requested. As above indicated claim 8 has been amended to include the substantive limitation of claim 10 and claim 10 is canceled. Claims 11 and 14 reflect specific embodiments further limiting claim 8 and as such should be allowable if amended base claim 8 is allowed.

Allowance of new independent claim 25 is also believed in order. Claim 25 contains all of the subject matter of claims 8 but adds the preferred electrolyte, namely CF_3SO_3Li . There is no teaching in any of the references of the desirability of forming a cathode for cell having an anode comprising lithium, wherein the cathode comprises CuV_2O_6 in admixture with a manganese dioxide, further with an electrolyte comprising (CF_3SO_3Li) , and resulting in a primary nonrechargeable cell. Accordingly, new independent claim 25 is believed patentable under 35 USC 103 over the references Sakurai, Isoyama, Ilic, Nakanishi, or Fujimoto alone or in any combination. Allowance of independent claim 25 is respectfully requested upon the Examiner's reconsideration of the Application.

Applicant also requests the Examiner's reconsideration of the "primary nonrechargeable cell" limitation which appears in independent claims 8 and 25. It is believed that such limitation, while it may be in part viewed as an "intended use" limitation, should also be viewed as a substantive "property or function" limitation. That is, Applicant's cell has the property that it is "nonrechargeable". As further support for such functional limitation, Applicant has endeavored to include

function" limitation. That is, Applicant's cell has the property that it is "nonrechargeable". As further support for such functional limitation, Applicant has endeavored to include additional substantive limitation in the body of independent claims 8 and 25, which helps Applicant achieve the "nonrechargeable" characteristic of the cell and which also provides additional basis for distinguishing the present invention over the cited art. Thus, the Examiner's reconsideration of the "primary nonrechargeable cell" limitation in the claims in view of the present Amendment herein is requested. See, In re Casey, 152 USPQ 235 CCPA 1967); In re Otto, 136 USPQ 458,459 (CCPA 1963). Cf., In re Duva, 156 USPQ 90 (CCPA 1967) (Court held that one could not ignore the preamble limitations "composition for depositing gold" and that all statements in the claims must be considered in determining obvious. The court stated: "Thus all factual differences which may be properly noted in any portion of a claim must be included within the basis for comparison with the prior art if we are to properly evaluate the differences between the invention defined in a claim and the prior art." 156 USPQ at 94)

The remaining claims 11-14 and 16 depend directly from base claim 8. These claims reflect specific embodiments of the invention and further narrow the scope of the base claim 8. Thus, the dependent claims should be allowable if amended base claim 8 is allowed.

Applicant has made the claims Amendment with every effort to place the application in condition for allowance. Formal allowance of the Application is respectfully solicited.

The undersigned attorney solicits a telephone call from the Examiner to clarify any questions which the Examiner may have concerning the application. Authorization is hereby given to debit Deposit Account 502271 for any amount owing or credit the same account for any overcharges in connection with this communication.

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Respectfully submitted,

Barry D. Josephs
Attorney At Law
19 North St.
Salem, Mass. 01970

Barry D. Josephs
Barry D. Josephs
Reg. No. 27,140
Tel. (978) 741-7999

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Barry D. Josephs
Barry D. Josephs